datacolor

Datacolor 45G™
User's Guide

Datacolor 45G User's Guide (December, 2011)

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To obtain information on local agents, contact either of the offices listed below, or visit our website at www.datacolor.com.

Americas (Lawrenceville, NJ)

Telephone: 1 (609) 924 2189 / 1 (800) 982 6496
Fax: 1 (609) 895 7472

Switzerland (Dietlikon)

Telephone: +(41) 1 835 3711
Fax: +(41) 1 835 3820

Asia (Hong Kong)

Telephone: +(852) 2420 8283
Fax: +(852) 2420 8320

Manufactured At:

Datacolor Technology (Suzhou) Co.
No. 288 Shengpu Road
Suzhou Industrial Park
Export Processing Zone B, Suzhou,
Jiangsu, P.R. China 215021

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

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Datacolor 45G™

About the Datacolor 45G™

The Datacolor 45G™ is a member of the newest generation of Datacolor hand-held color measuring instruments, incorporating state-of-the-art CMOS integrated circuit technology in the instrument design. It is intended for use as a device for measuring, specifying and evaluating color in both laboratory and industrial settings.

Electrical/Environmental Requirements

Power	5Vdc, 3.2A (input to the 45G)
	100 – 240 VAC(input to the AC power adapter)
	50/60 Hz, 0.6A Input
	Lithium Ion Rechargeable Battery, 3.7V
Battery	Charge Voltage 4.2V
	Maximum Charge Current: 1.5A
	Charge: 0<T<50°C Discharge : -20<T<60°C
	Store between 40% and 50% capacity;
	Do not store above 140°F (60°C). Do not crush, short circuit, mutilate, reverse polarity, disassemble, or dispose of in fire; might explode, cause burns, or release toxic materials.
Absolute Operating Environment	5º to 40º C
	20-85% RH, non-condensing

Indoor Use
Altitude up to 2,000 meters

Safety Warnings

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Battery: Do not store above 60°C (140°F), crush, short circuit, mutilate, reverse polarity, disassemble, or dispose of in fire; might explode, cause burns, or release toxic materials.

CAUTION
There are no user-serviceable parts for this equipment.

For battery replacement: Unit must be returned to factory or an authorized Datacolor Service Center.

Light Source

Do not stare directly into the open port located in the bottom of the instrument when the measurement is in progress. **Staring directly into the light source can result in eye discomfort similar to that of staring at a camera flash.**

Power

CAUTION
Disconnect power before servicing.

The power supply supplied with the unit must be used.

Feature Summary

The Datacolor 45G™ employs state-of-the-art features including the spectrometer, light source, and optics. Below is a summary of those features:

FEATURE	DESCRIPTION	PURPOSE/BENEFIT
Measurement Geometry	45/0º geometry	Provides accurate and repeatable measurement of smooth and textured surfaces Includes a built-in 60º gloss meter for simultaneous measurement of Gloss and Color
SP2000 Spectral Analyzer	Proprietary dual-channel holographic grating. 256-photodiode linear arrays used for both the reference and sample channels.	Dual channel design provides continuous monitoring of sample illumination and compensates for changes. 256-photodiode array enhances the precision of the measurement.
Light source	Total Bandwidth LED Illumination	Provides consistent full width illumination for accurate and repeatable color measurement
Wavelength Resolution	10 nm	Reflectance data is measured at 2.5nm intervals from 400 – 700nm.
Effective Bandwidth	10nm	Greater precision enhances the measurement accuracy.

Accessories

All models come with the following standard accessories:

- AC Adaptor with power cable
- Targeting foot
- USB cable
- Calibration stand with Black Trap, White Tile and Gloss Tile
- USB Flash Drive with Calibration Data

Calibration Tiles

A black trap, white tile and Gloss tile are provided in the calibration tray of the Datacolor 45G.

- The black trap ,white tile and gloss tile are used each time the instrument is calibrated.

Quick Start Instructions

The Datacolor 45G Portable Spectrophotometer is bundled with Datacolor Tools software. Datacolor Tools software is used to configure the Standards and Tolerances you will want to use with the 45G. So it is very important that Datacolor Tools software is installed and operating first. Please consult the Quick Start Guide for Datacolor Tools in the Tools software case.

More complete instructions are included later in this Guide.

Charging the Instrument:

Please make sure that your Datacolor 45G instrument is fully charged before using. The instrument does not charge through the USB connection, so it is necessary to use the AC Adaptor to charge the instrument.

Each AC Adaptor comes with a collection of plugs for connecting to power supplies in different regions. Select the appropriate plug for your region and place it into the charger head by sliding the lock open and snapping the plug in place. Make sure that the lock slides firmly back in place and that the plug is secure before plugging into your Power Outlet.

Global Plugs

Sliding Lock

Lock in Place

! NOTE: The Power Switch at the back of the instrument must be in the ON position to accept a charge. The instrument will not charge when turned OFF.

Connecting the Instrument:

The Datacolor 45G connects to your computer via USB or Bluetooth.

! NOTE: Before you connect the instrument for the first time, please install the Datacolor Tools software provided with the instrument. When fully installed, close the Tools software for the initial Driver connection to the instrument.

To connect the instrument, connect the instrument to the computer via the USB cable and press the PC Access button

For USB, make sure that the instrument is connected to the computer via the provided USB cable and that the Tools software is up and running. For Bluetooth, please make sure that Bluetooth is ON in your computer.

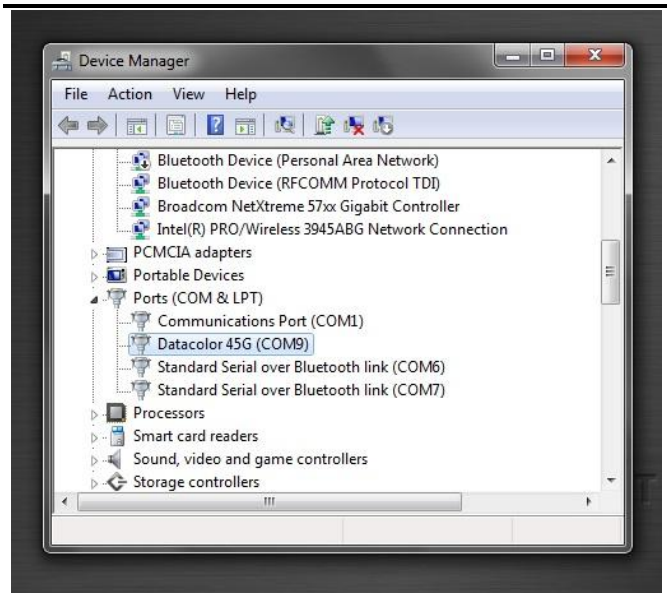
The PC Access screen will show the connection has taken place by displaying arrows on the connection icon.

Not Connected

USB Connected

The Computer will display a message saying that new hardware is found and the driver is being installed.

The 45G uses Serial over USB communication, so you will need to open the Device Manager in the Control panel. Open the Ports (COM & LPT) section:



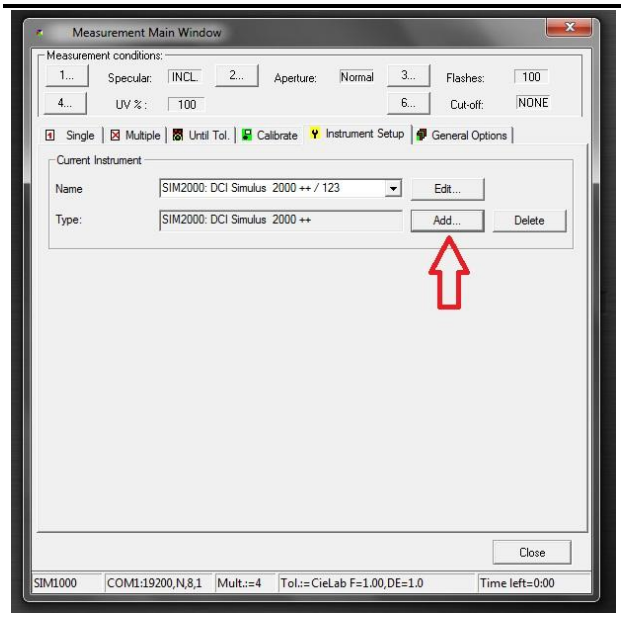
You will see the Datacolor 45G listed with a Com Port address. Make note of that address and close the device manager. This step is only necessary for the first time an instrument is connected To the Tools software. This address will be remembered by the software after you enter the information in the procedure below.

Start the Datacolor Tools software.

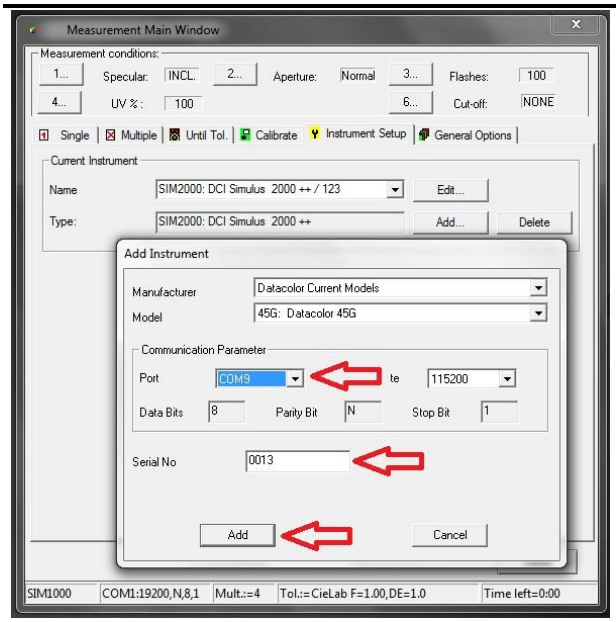
If you have chosen the Textile mode, the default User name is DCI. No password is assigned, so leave the Password field blank.

If you have chosen the Pigment mode, the user name is USER and the password is CC3.

The next window to open is the Driver's measurement window. Press the ADD button to add the 45G to the Driver list:



Select CURRENT DATACOLOR INSTRUMENTS and 45G from the drop down menus:

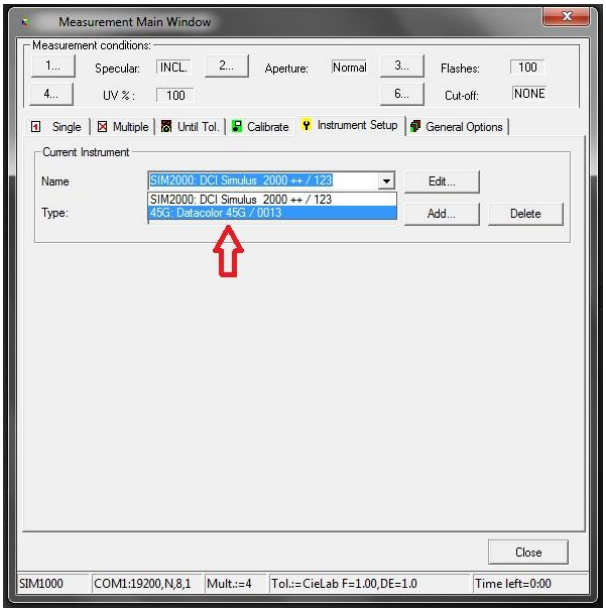


Select the COM port that was noted earlier in the PORT menu of the Device Manager.

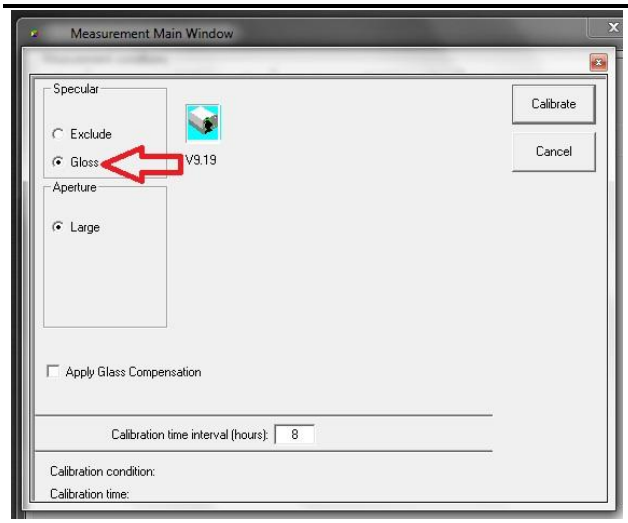
Enter the serial number of the instrument (labeled on the bottom of the 45G.)

Click ADD to complete the driver process.

If the 45G does not appear in the NAME field, click on the drop-down menu and select it:

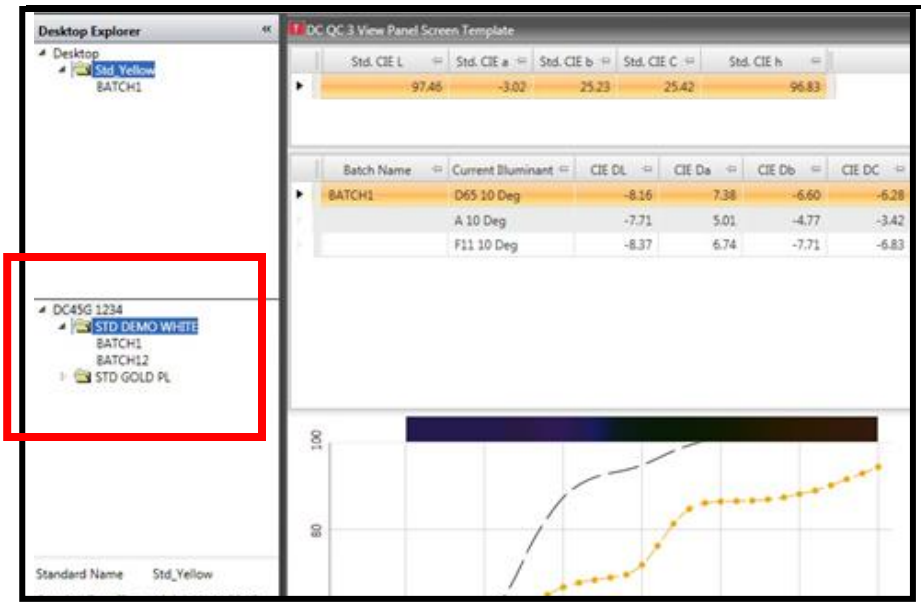


The Driver window will now prompt you to calibrate the instrument. If you wish to use the integrated Gloss Meter, Press the radio button next to GLOSS and click calibrate:



You should now calibrate the instrument, following the instructions from the Calibration Wizard. When calibration is complete, the main Tools program will open.

When connected, the device will appear as a remote drive in the explorer panel on the left-hand side of the Tools Screen. The standards will appear as folders in that drive. Batches will be in the folders. (see RED box in image below.)



! NOTE: While connected, the Datacolor 45G acts as a dumb instrument and does not display or store measurement results. If you navigate away from the PC Access window on the instrument, the connection to the computer will be severed.

Quick Start - Calibration:

The instrument can be calibrated in either stand-alone mode or through Datacolor Tools software.

To calibrate in stand-alone mode, press the Calibrate button and following the directions, measure the black trap, the white tile and the black tile on the calibration stand.

To measure through the Tools software, select the Instrument tab in the top menu ribbon and then press CALIB:

The calibration wizard will then walk you through the steps for calibrating. Choose the GLOSS option if you want to make Gloss measurements. This will ensure that you calibrate got Gloss.

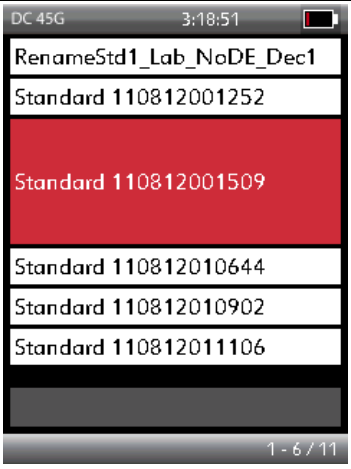
Quick Start - Creating a Standard on the Instrument:

Although the Datacolor Tools Software is intended to be the Standards Creation center for the 45G instrument, you can create a new standard on the instrument by selecting a standard with the appropriate tolerances and measuring new standard data against it.

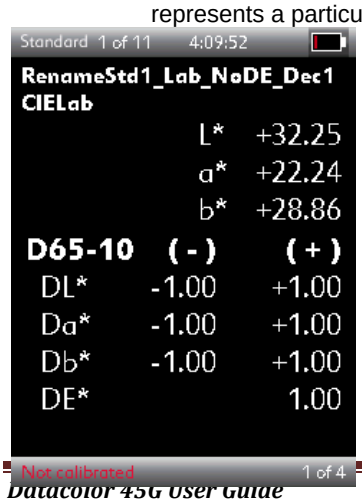
Quick Start-Standard:

First, Select Standard on the main screen

Then scroll though the available standards by pressing the left arrow. (Three default standards are pre-loaded from the factory.) The Standard in the red field is active.



Tolerances can be viewed on each standard by pressing the up/down arrows. Each screen represents a particular tolerance/illuminant combination.



Quick Start –Batch Display:

Once you find a set of tolerances that are acceptable, measure your new standard with that screen active. A new Standard will be created. The default name will contain the time date stamp. (If you require custom naming of your standard, please refer to the User Guide CD enclosed with this package.)

Pressing the OK button will put the instrument in Batch Measurement mode. The Name of the standard will appear on the screen. Measure your sample and the results will look like this:

The Green Check marks indicate a PASS. The Red X's indicate a FAIL. The Gray Boxes mean that no tolerance has been selected for that parameter.

Main Menu

Navigation:

Tap Desired Icon to access function or navigate using 5-way button (up, down, left, right and OK)

OK selects highlighted function

Left button backs out to previous window.

Calibration:

! Important NOTE:

The Calibration Tray provided with the Datacolor 45G can accommodate the instrument with the target foot attached or detached. However, to ensure repeatability in calibration, two anchoring plates is provided to hold the instrument firming in place when the targeting foot is not attached, one on the Black/White color calibration side and one on the Black Gloss tile side.

If you need to measure with the Targeting Foot, be sure to remove the anchoring plates first. These can be stored inside the Calibration stand where they can be snapped into an internal holder.

Place the Instrument into the Calibration tray with the measuring aperture over the Black Trap hole

Measure the Black Trap and wait for the Green Light before moving the instrument

When the White Tile Light is Blue, measure and wait for the green light .

Then read the Black Gloss Tile on the opposite side of the Calibration stand.

The Black Tile will show in this screen only when GLOSS is active.

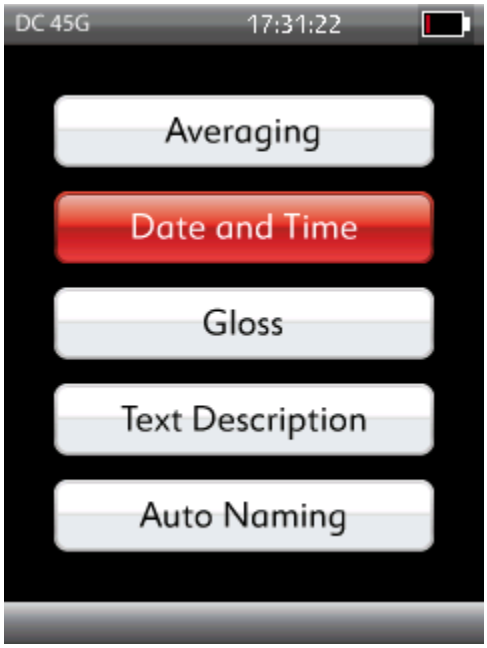
(GLOSS can be turned ON or OFF in the Settings Menu.)

After the Black Gloss Tile is measured, the screen will show GREEN lights on all calibration functions. Click OK to accept the calibration and return to the main Menu.

Note: Hit the Left Button to escape without calibrating.

Settings:

The Settings menu shows Five options. Tap the desired option, or scroll up and down through the options using the up/down buttons, then hit OK. The Active Option is highlighted in Red.

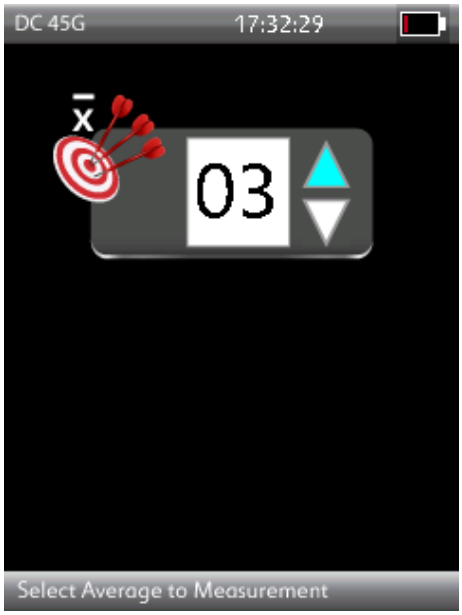


Averaging

Hit OK to Open function screen

Use up/down buttons to set number of measurements to average (Default is 01)

OK button to return to Main Menu, or hit left button to escape without changing the setting



Date and Time

Use left/right buttons to navigate through fields for Time and Date. (24 hour clock)

Use up/down buttons to set numbers in each field

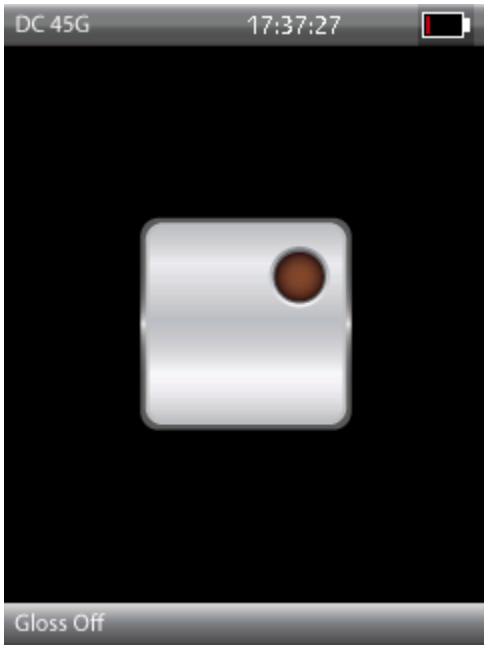
Hit OK Button to save or hit left button to escape without changing the settings

Gloss

Hit OK to change status

Red is Off. Green is On

Hit left button to save and escape back to Settings menu

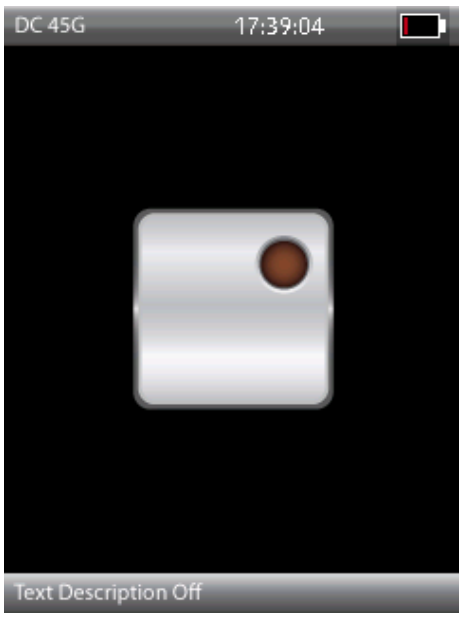


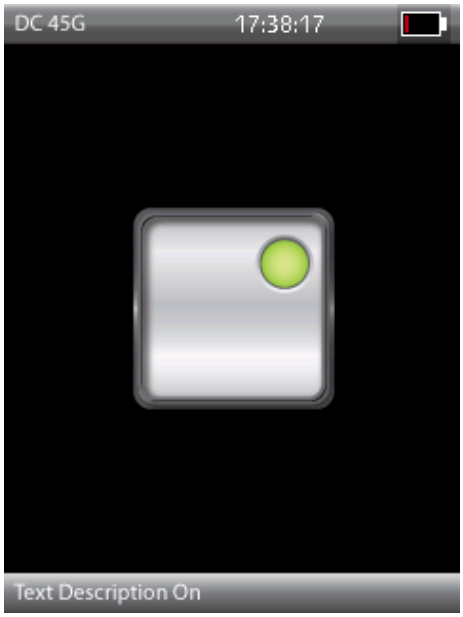
Text Description

Hit OK to change status

Red is Off. Green is On.

Hit left button to save and escape back to Settings menu.



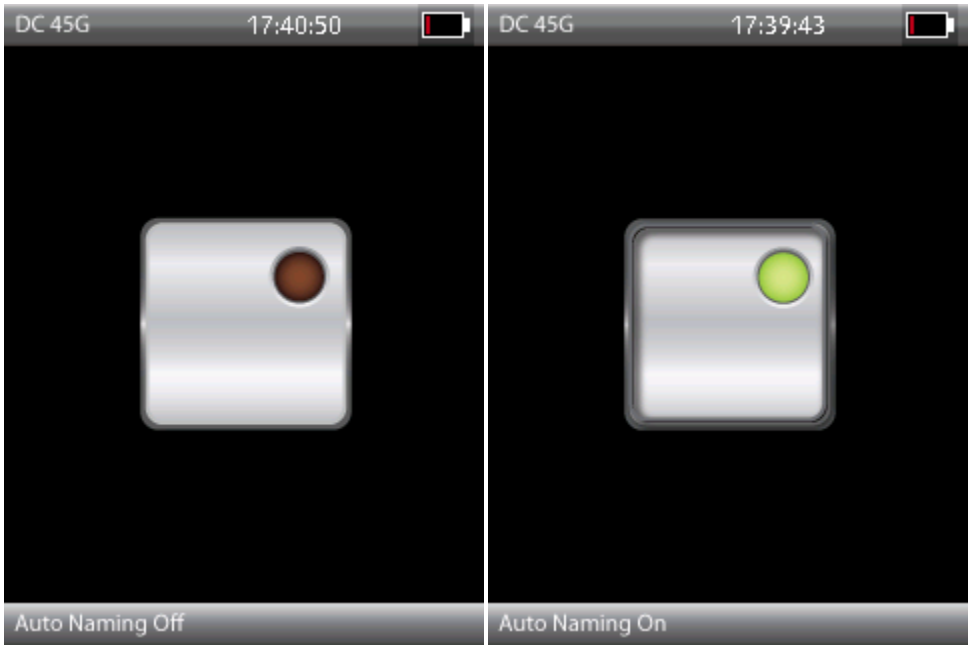


Auto Naming

Hit OK to change status

Red is Off (allows custom naming of standards and batches)

Green is On (automatically assigns time/date stamp as name)



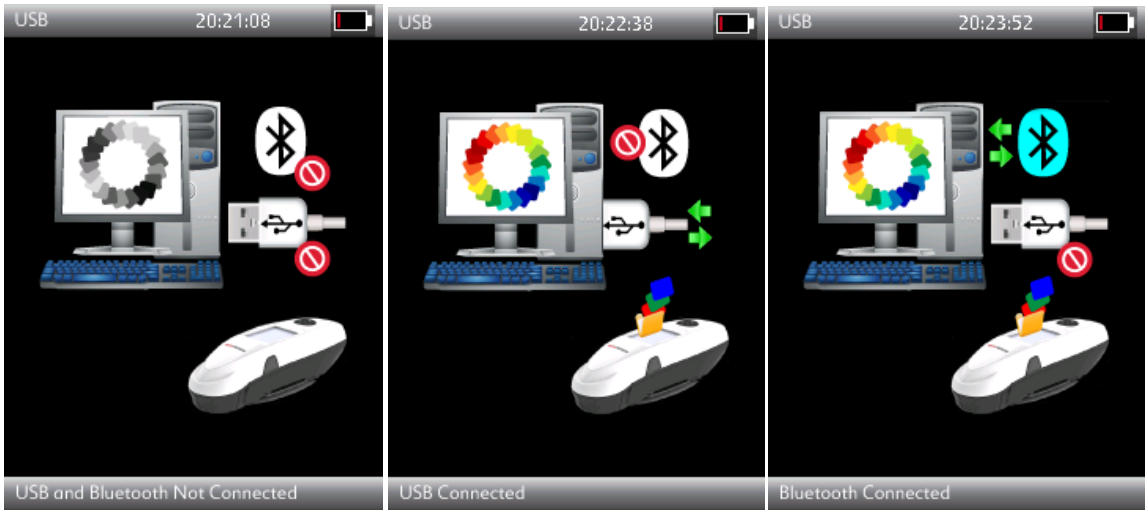
System Update – (New Feature)

Insert USB Flash Drive with New Firmware upgrade and follow directions on screen

Hit OK to complete Firmware System update

Firmware application will restart.

PC Access:



No connection USB Connected Bluetooth™ Connected

Tap the PC Access icon or navigate to the icon using the navigation buttons and press OK.

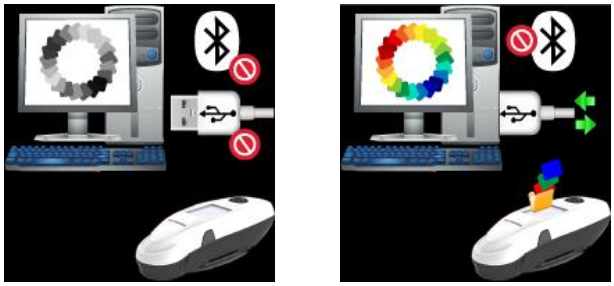
If you want to use the Bluetooth™ connection:

Check the device manager on your PC to make sure your Bluetooth receiver is on and that you can see the 45G connection (the 45G Bluetooth radio is always on when the instrument is in the PC Access mode.)

The display on the 45G will show when connections are active, as in the diagrams above.

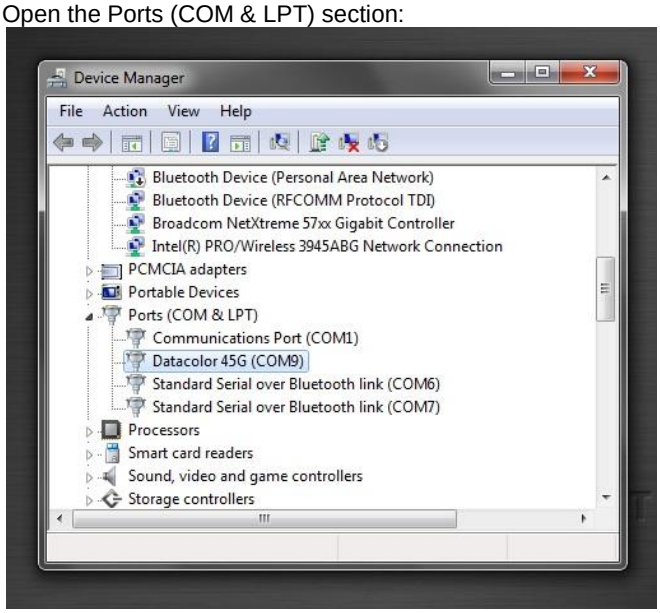
To establish a USB connection:

The PC Access screen will show the connection has taken place by displaying arrows on the connection icon.



Not Connected **USB Connected**

The Computer will display a message saying that new hardware is found and the driver is being installed.
The 45G uses Serial over USB communication, so you will need to open the Device Manager in the Control panel.
Open the Ports (COM & LPT) section:



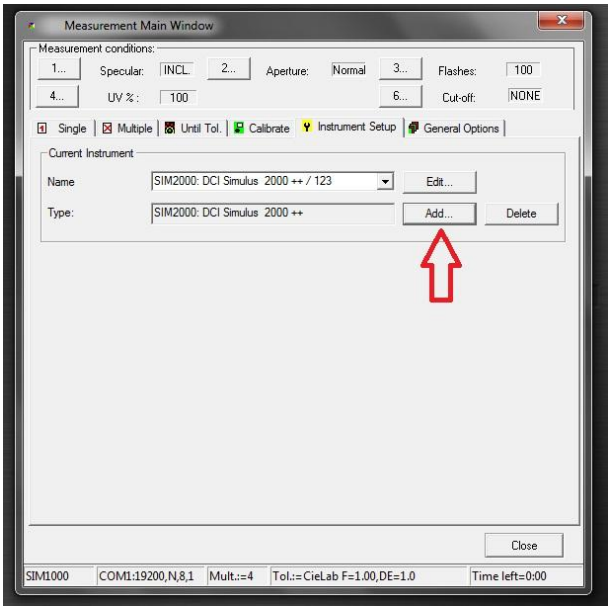
You will see the Datacolor 45G listed with a Com Port address. Make note of that address and close the device manager. This step is only necessary for the first time an instrument is connected To the Tools software. This address will be remembered by the software after you enter the information in the procedure below.

Start the Datacolor Tools software.

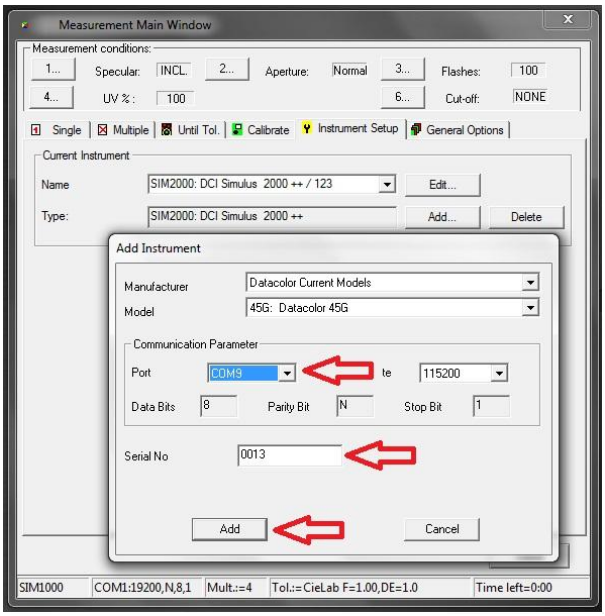
If you have chosen the **Textile** mode, the default User name is **DCI**. No password is assigned, so leave the Password field blank.

If you have chosen the **Pigment** mode, the user name is **USER** and the password is **CC3.**

The next window to open is the Driver's measurement window. Press the ADD button to add the 45G to the Driver list:



Select CURRENT DATACOLOR INSTRUMENTS and 45G from the drop down menus:

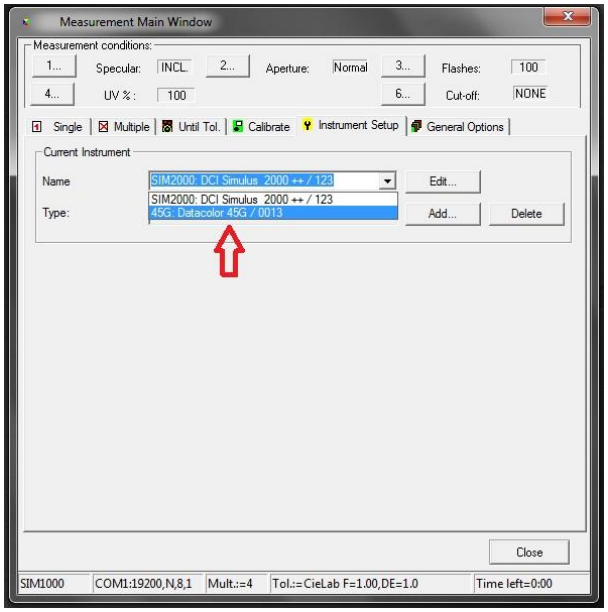


Select the COM port that was noted earlier in the PORT menu of the Device Manager.

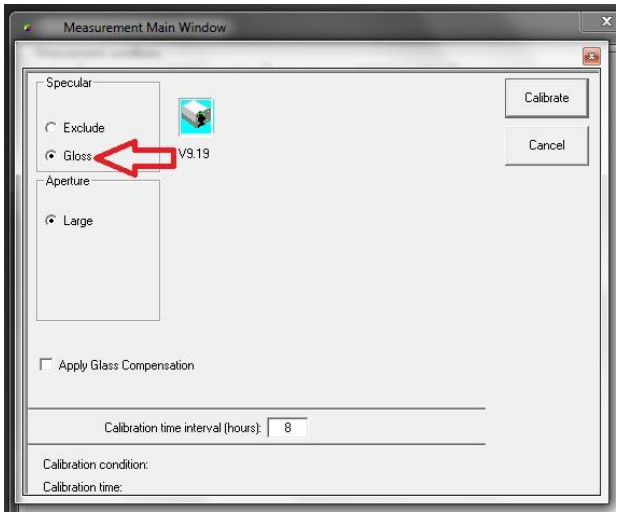
Enter the serial number of the instrument (labeled on the bottom of the 45G.)

Click ADD to complete the driver process.

If the 45G does not appear in the NAME field, click on the drop-down menu and select it:



The Driver window will now prompt you to calibrate the instrument. If you wish to use the integrated Gloss Meter, Press the radio button next to GLOSS and click calibrate:



You should now calibrate the instrument, following the instructions from the Calibration Wizard. When calibration is complete, the main Tools program will open.

Bluetooth™ Communication:

To use the instrument in Bluetooth mode, make sure that your computer's Bluetooth adaptor is ON.

Put the device into PC ACCESS mode.

Your computer will ask you to pair the device to the computer. Enter 1234 as the pairing code.

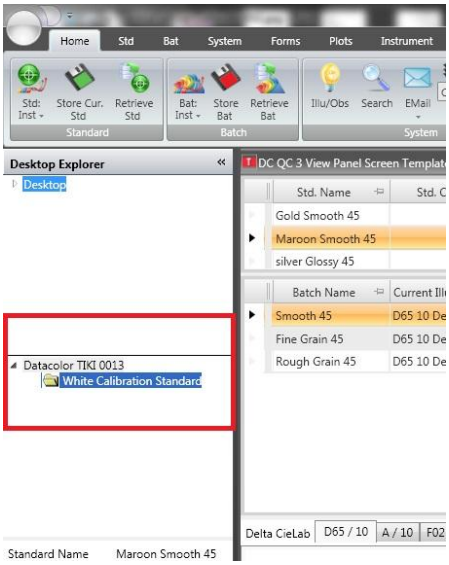
As above for USB connection, check the Device Manager on your computer for the COM Port connection and use that port number when you set up the instrument, as above in the USB procedure.

! Important Note:Instrument must remain in PC Access mode when communicating with the Tools Software.

Communicating with Datacolor Tools Software:

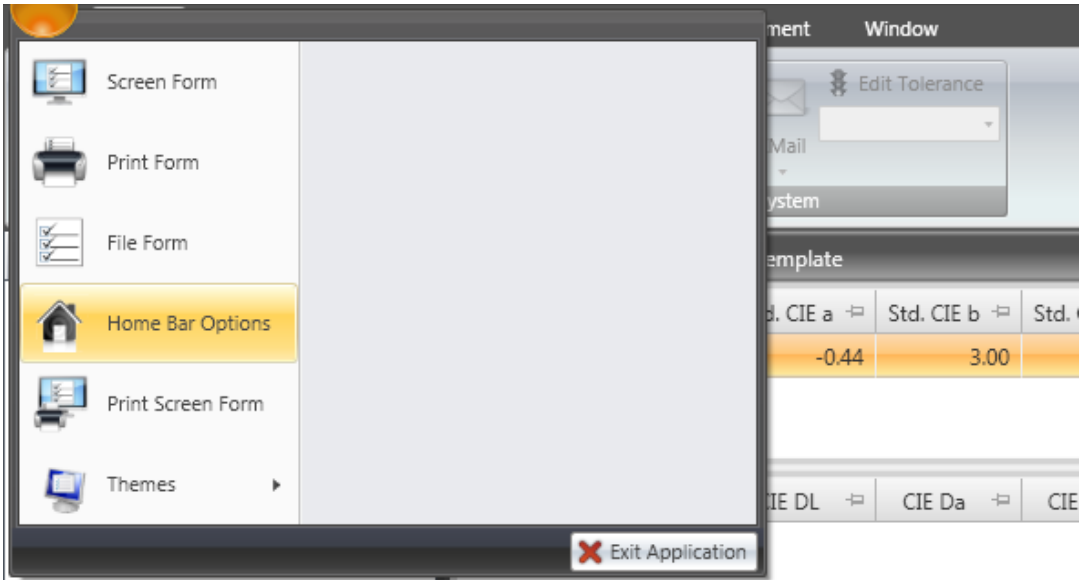
Consult the Datacolor Tools User Guide for detailed information about the operation of Tools Software.

Once connected, the 45G instrument shows up in the Tools explorer Window as a flash drive:

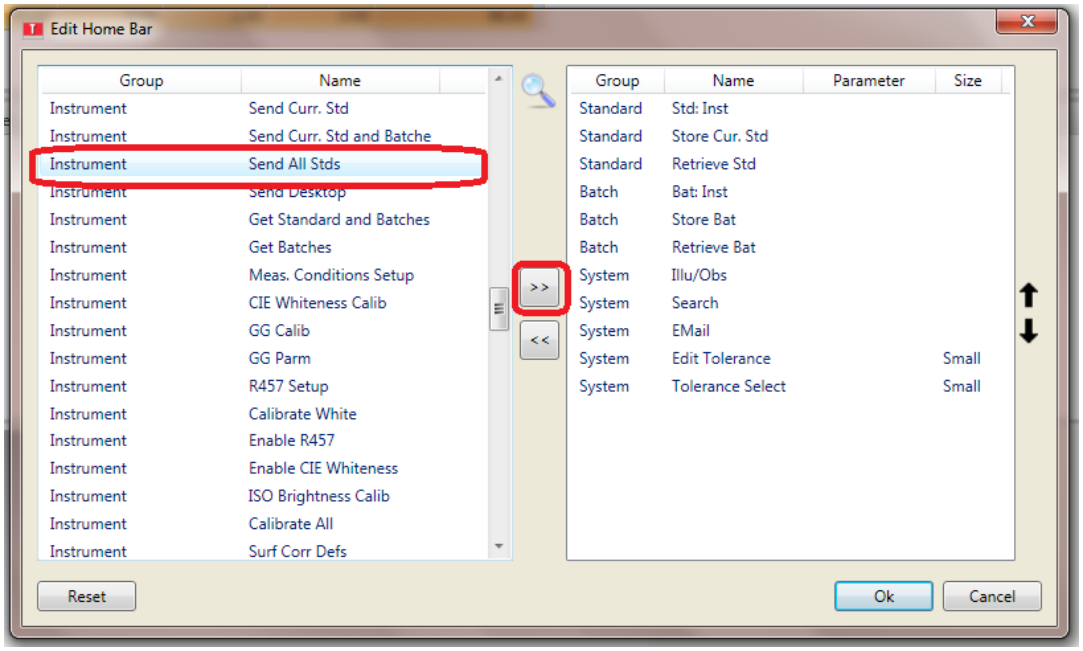


Setting Up TOOLS software for Portable Operation:

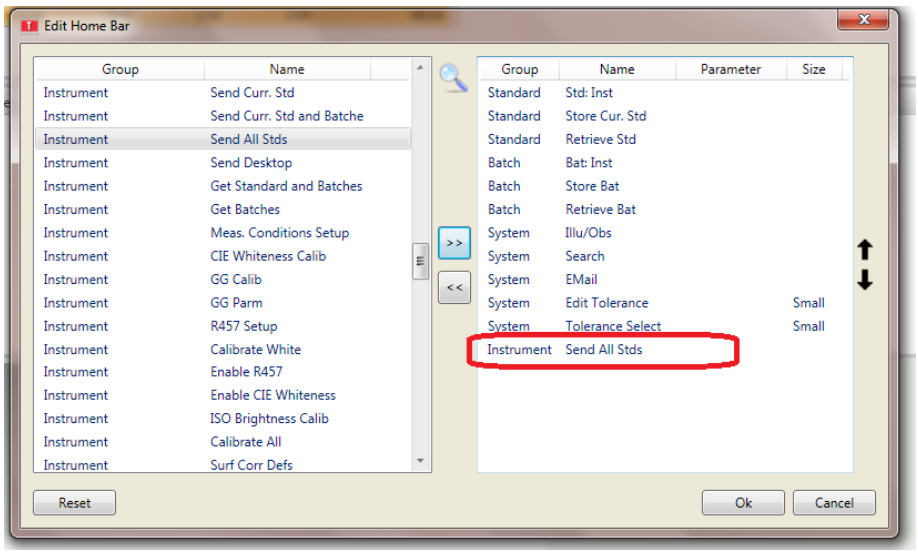
To make the transfer of standards easier, please add the following functions to the Home Bar by Clicking on the Circle in the Upper Left-hand corner of the screen and clicking on Home Bar Options:



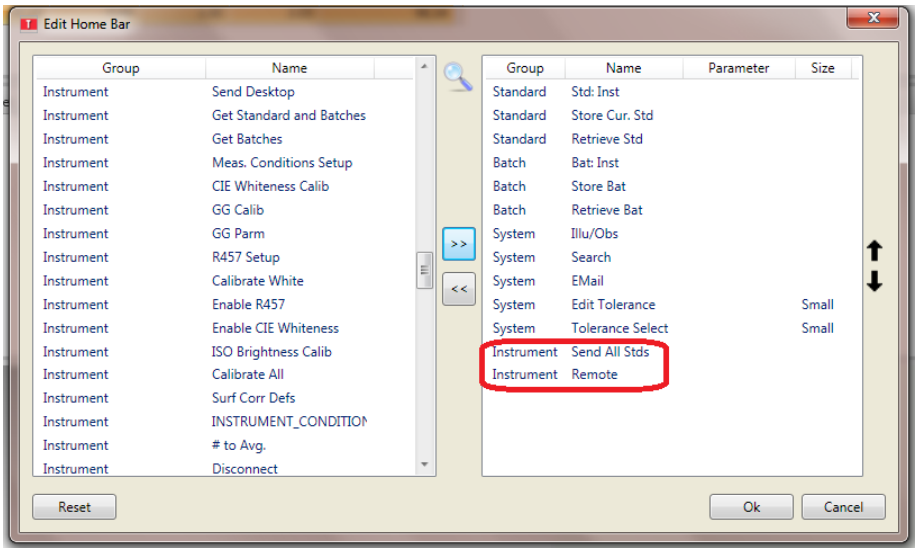
In the EDIT HOME BAR screen, scroll down to INSTRUMENT SEND ALL STDS and hit the right arrow button to move this function over to the Active list:



Click OK on the Add Button screen and function will move over to the Active list:



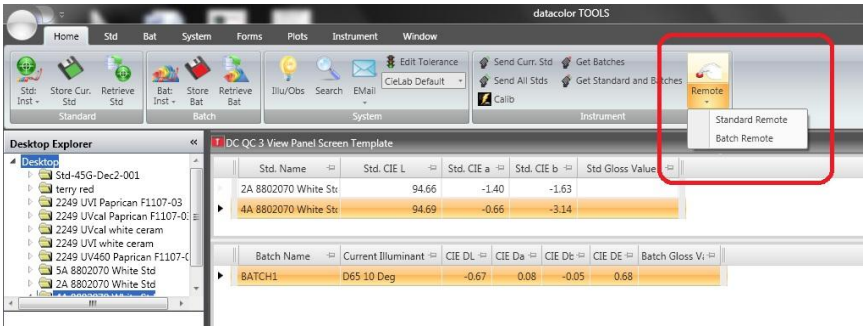
Scroll down the left-hand list again and select INSTRUMENT REMOTE, repeating the process. Click OK to exit the Home Bar Edit screen:



Those Functions now appear in the Home Bar, enabling you to send all of your standards to the instrument with one click and allowing you to use the measurement buttons on the instrument to enter data into Tools software:

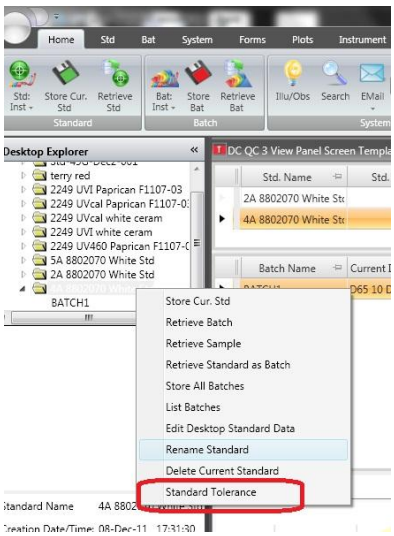
Creating Standards in Tools

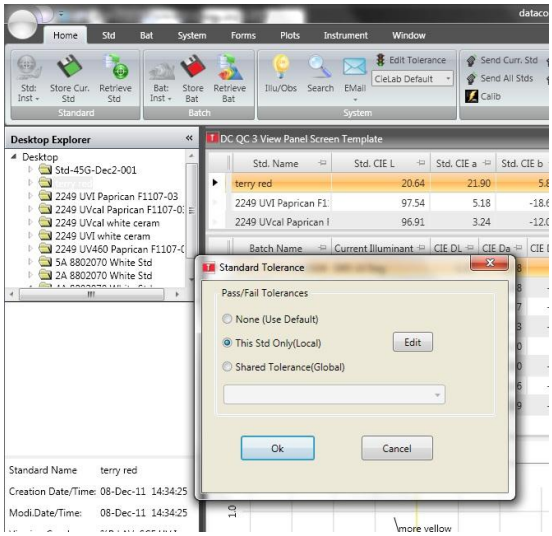
To activate the 45G in Tools Software , Go to the Remote Measure button in the Top Tool Bar and select “Measure Standard.” Hit the measure button on the 45G and then enter the name



Creating Tolerances

Highlight the new standard in the Tools Explorer window on the left-hand side of the screen. Right-click and select the *Standard Tolerance* option.





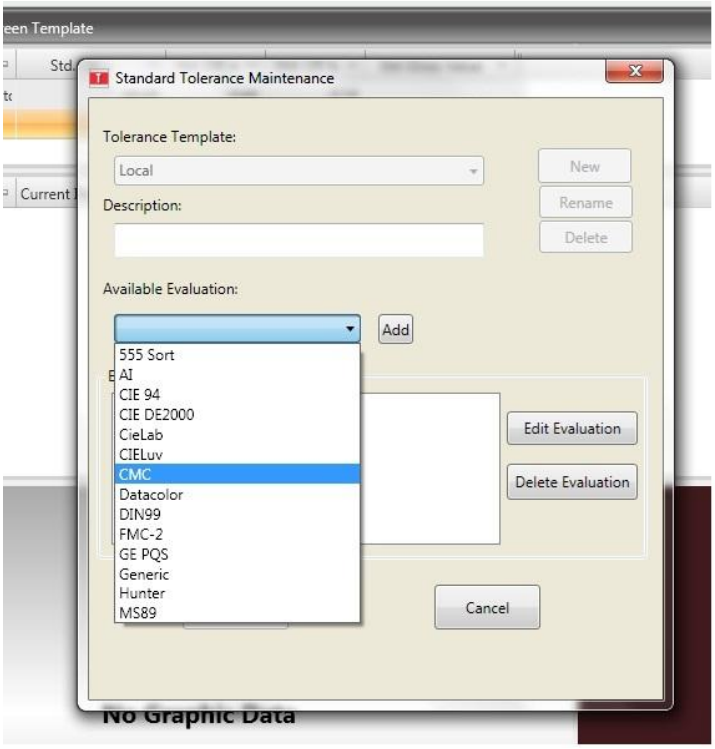
The Tolerance Dialog box will open and offer three tolerances:

The *Global* option allows you to choose a set of Global tolerances that can be used as a default for all standards.

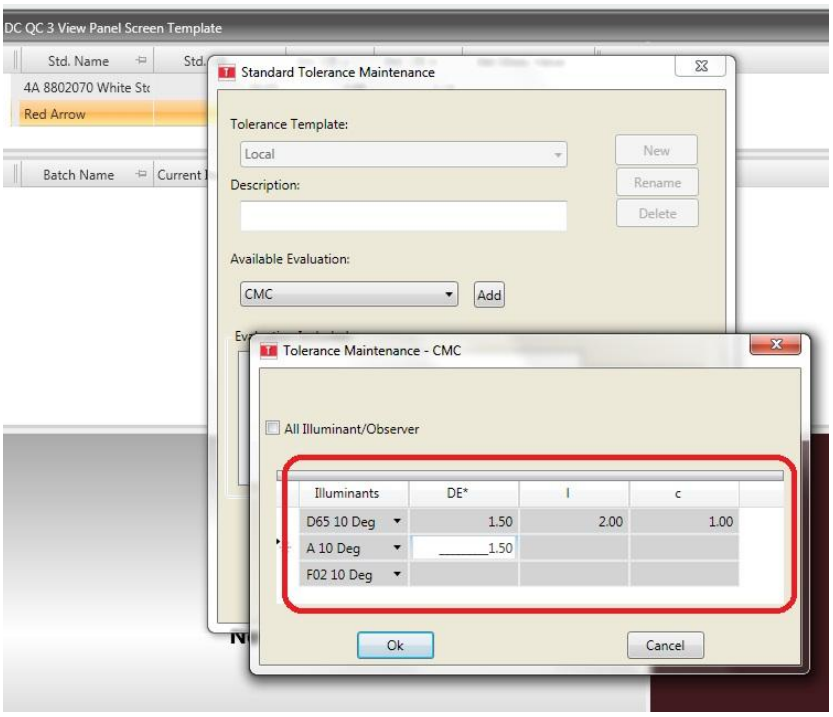
Shared options will allow you to select previously constructed tolerances that are either shared with a specific group of standards (for example a specific customer or manufacturing process.)

The *Standard Only* option will allow you to create a special set of tolerances for this new standard.

Select a tolerance from the Drop Down Menu and add it to the tolerance list:



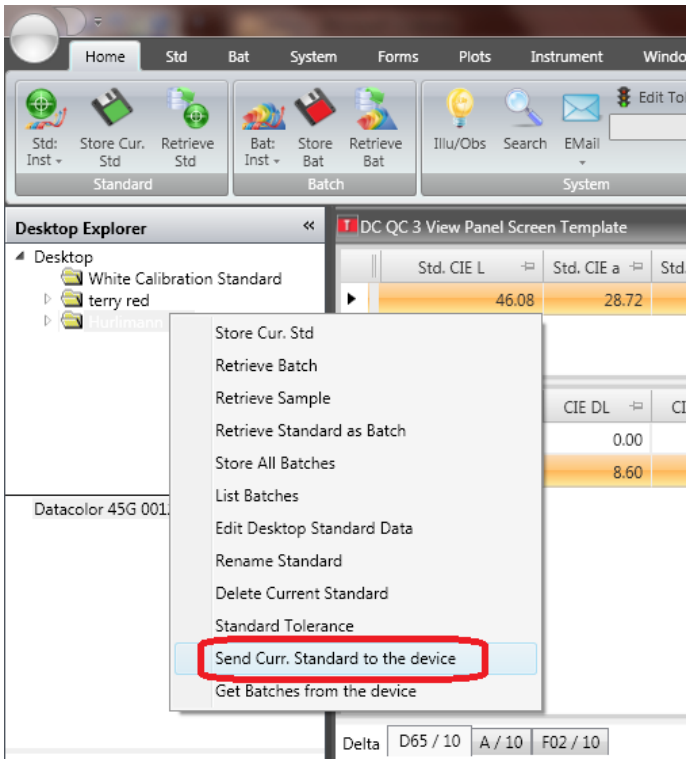
Uncheck the All Illuminants box and select the appropriate Illuminant/Observers and Parameters for your standard:



Click OK to close the tolerance maintenance Window.

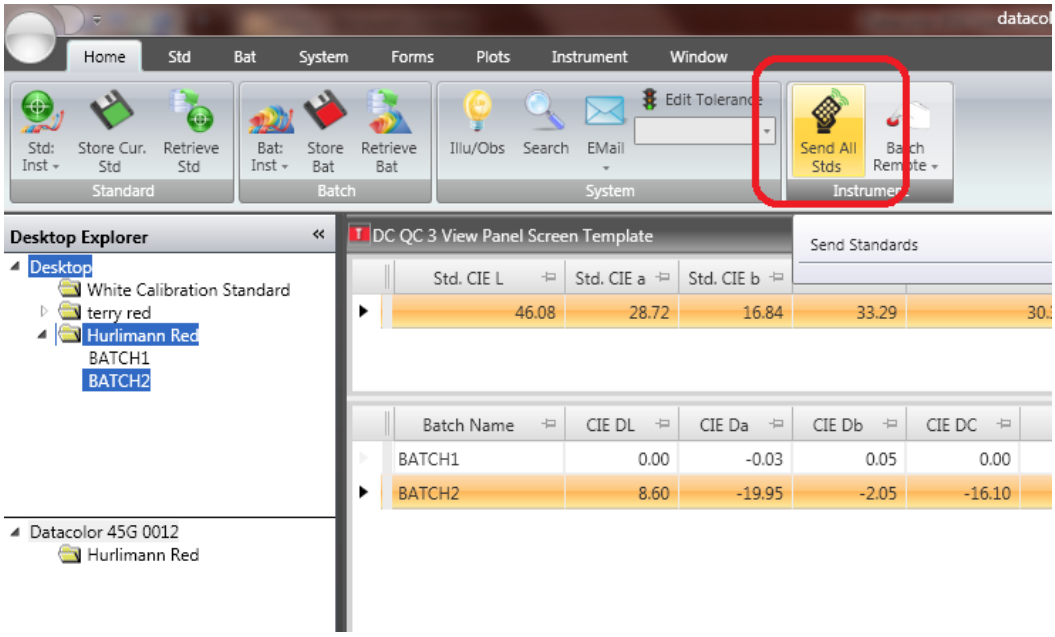
Loading Standards from Tools to the 45G

To send a single standard from the Tools desktop to the 45G, Select the standard in the Tools Explorer, right click and select *Send Curr. Standard to the Device.*

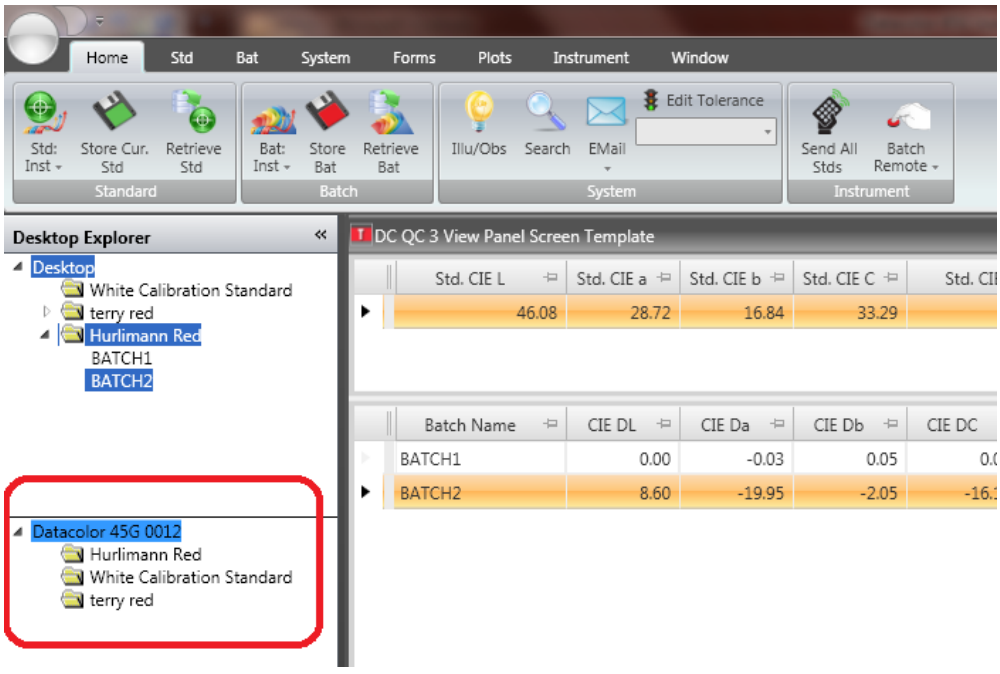


To send all standards from the Tools desktop to the 45G instrument,

Press the Send ALL STDS button installed on the Home bar at the top of the screen:



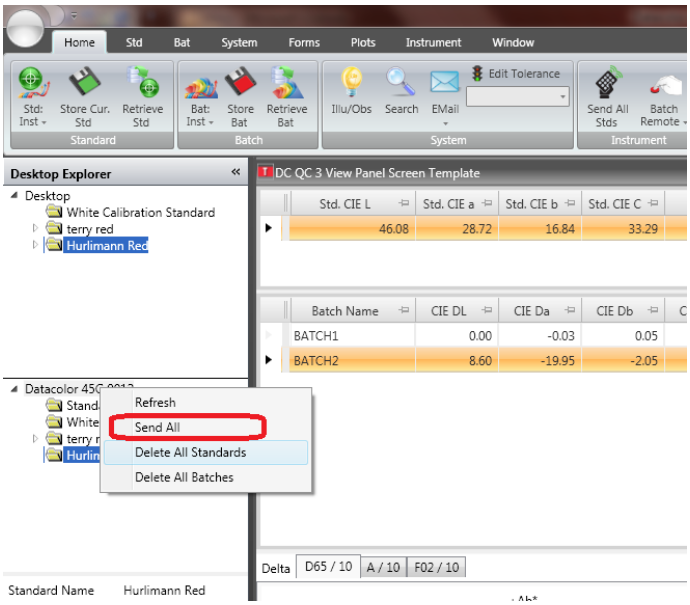
The Instrument Drive will then display the newly transferred standards:



Disconnect the Instrument by hitting the left button on the instrument to get out of PC Access mode, and then detach the USB cable. The instrument is now ready for stand- alone measurement.

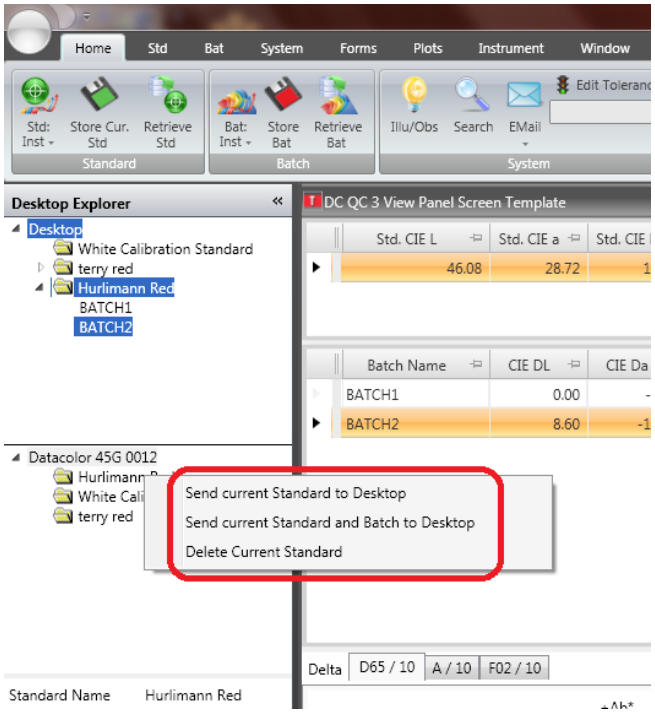
Transferring Batches into Tools from the 45G Instrument

After measuring batches, reconnect the 45G to the Tools software. The instrument will again reappear in the Tools Explorer window as a Mass Storage Drive. To send all Batches to the Tools Desktop , right-click on the Instrument name and select SEND ALL:



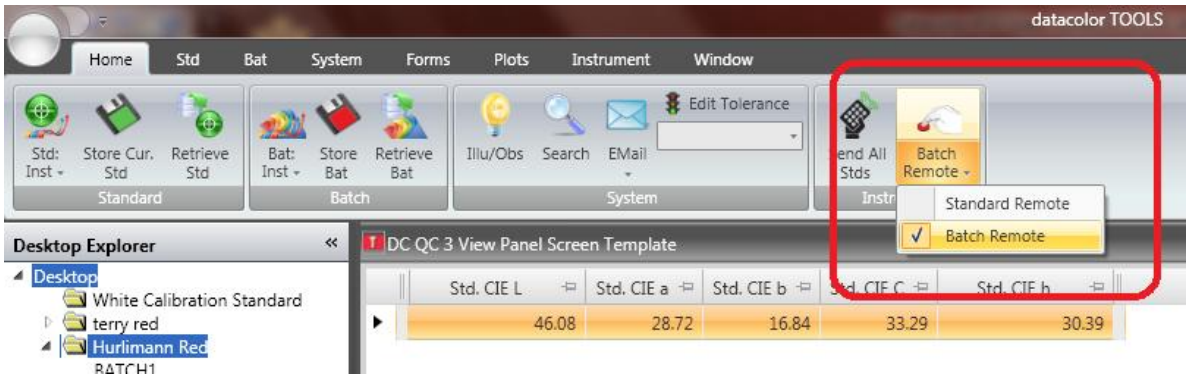
The same menu will allow you to Delete All Batches, Delete All Standards (and their batches) and to refresh the status of the instrument connection.

To send the batches of only a single standard, right –click on the Standard Name. You can then send the Standard only or the Standard and all its batches. You can also delete the Current Standard from this menu:

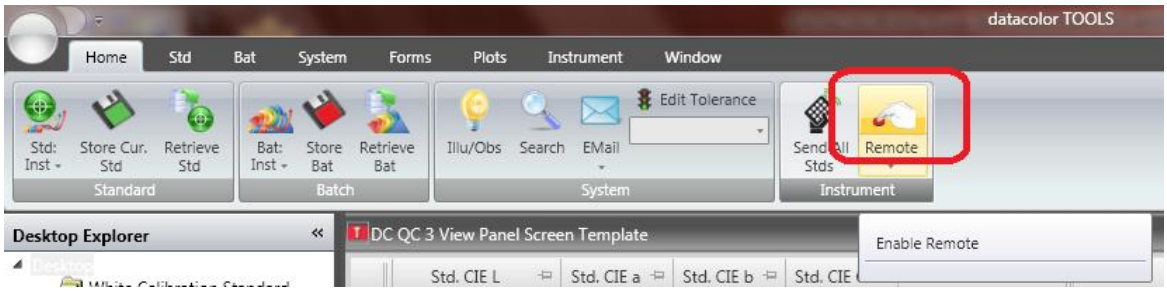


Measuring Batches directly into the Tools Desktop

The 45G can measure batches directly into the Tools Desktop. You must first go to the Remote Measure button and select BATCH REMOTE:



Then enable Remote measurement by pressing the REMOTE Button:



In this mode, the 45G acts like a desktop instrument and does not store or display data.

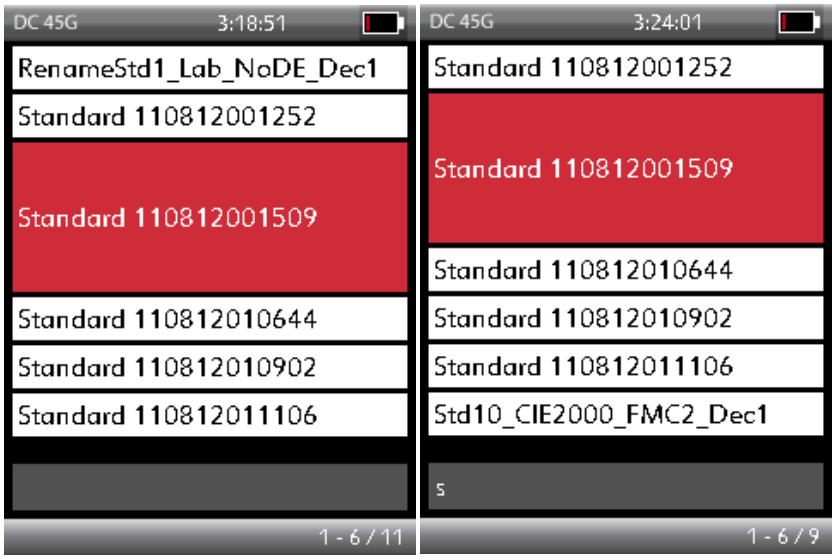
! Important Note:

Instrument must remain in PC Access mode when communicating with the Tools Software.

Stand-Alone Operation

Standards & Batches:

List of standards appears:



Selection is highlighted in Red Field. Use **Right** button to go down the list

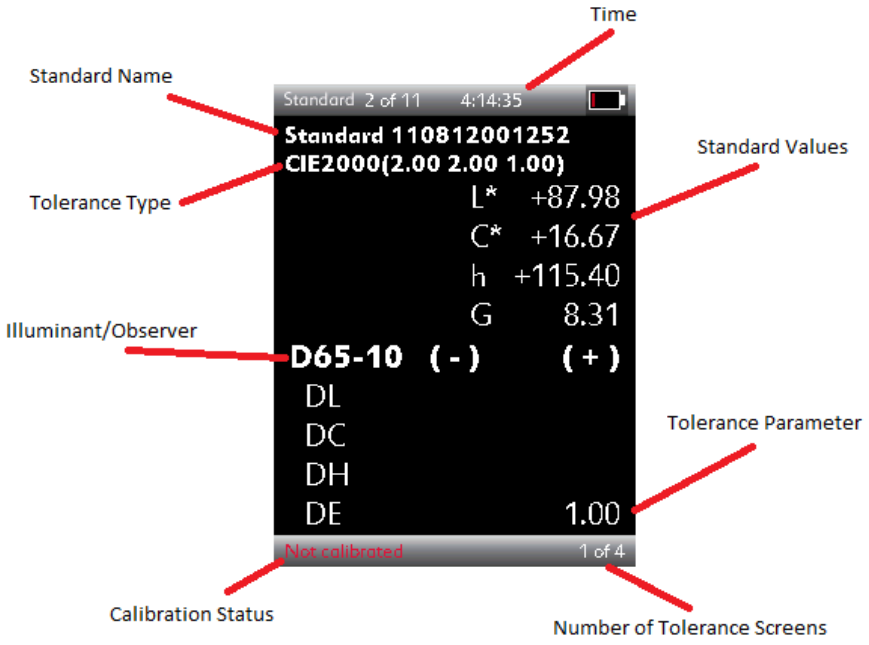
Use **Down** button to page down for more standards

Use **Up** button to go back up to previous page

Use **Left** button to escape back to the Main Menu

Use **OK** Button to select a standard

Navigating tolerances in a standard



Use down button to view other tolerances and Standard Reflectance data

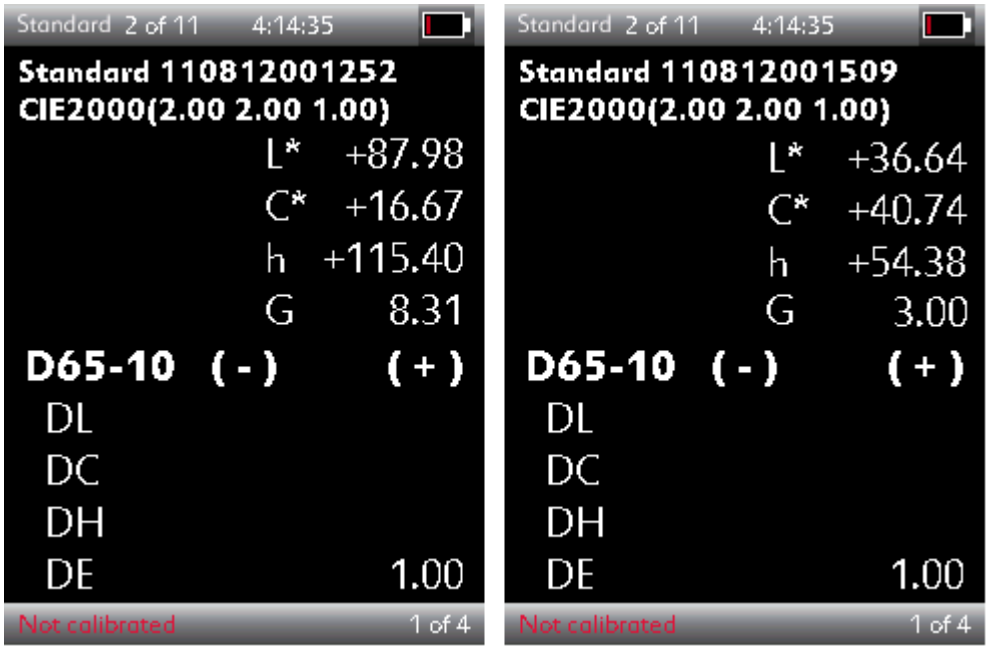
The bottom bar will indicate how many windows are active for the standard. E.G., “1 of 4” means that there are three tolerances associated with the standard and a fourth window displays the Reflectance data. Clicking the DOWN button will access the other tolerances and the Reflectance values Screen:

Standard Cloning

Create a new standard on the instrument by cloning an existing standard

Choose a tolerance on the instrument with the desirable tolerances.

(Tolerances are not editable on the instrument)



Measure the new target while in standard mode to create a new standard.

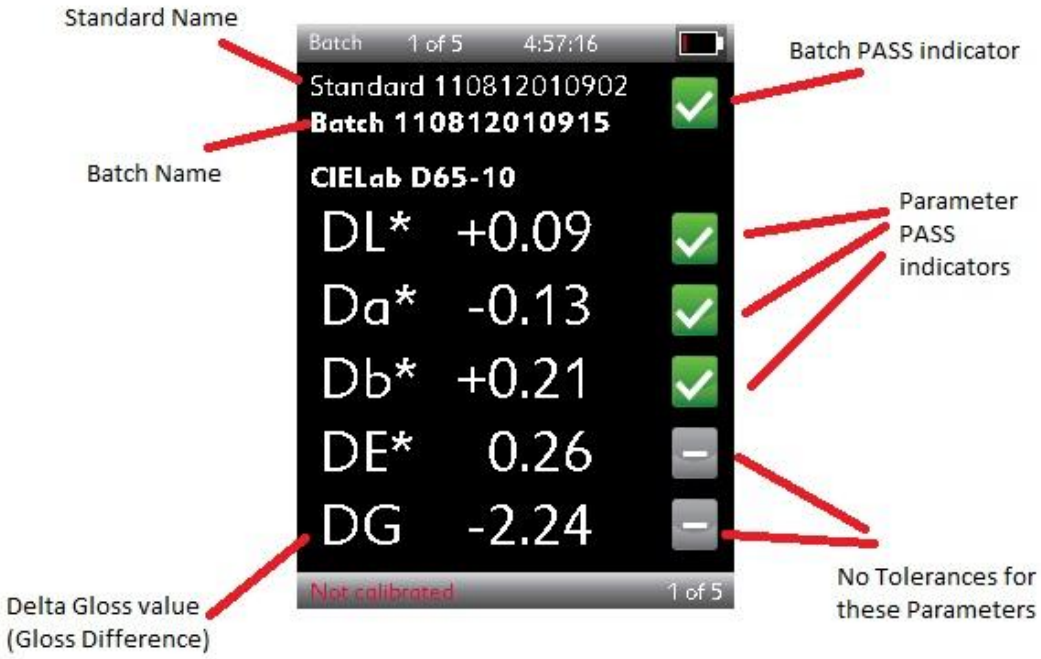
The new standard uses the tolerances of the original standard

To Measure a batch against the Standard, hit OK

Measure a new batch by pressing either of the black measurement buttons on the sides of the instrument.

The Green Checks mean PASS. The Red Xs mean FAIL.

Navigating tolerances in a Batch



Use down button to view other tolerances and Standard Reflectance data (The bottom bar will indicate how many windows are active for the standard. E.G., “1 of 4” means that there are three tolerances associated with the standard and a fourth window displays the Reflectance data. A fifth window will display the Metameric Index (CIE) for each combination of Illuminant/observer pairs in the Batch’s tolerances.

N O T E S

Cable Installation and Power Switch

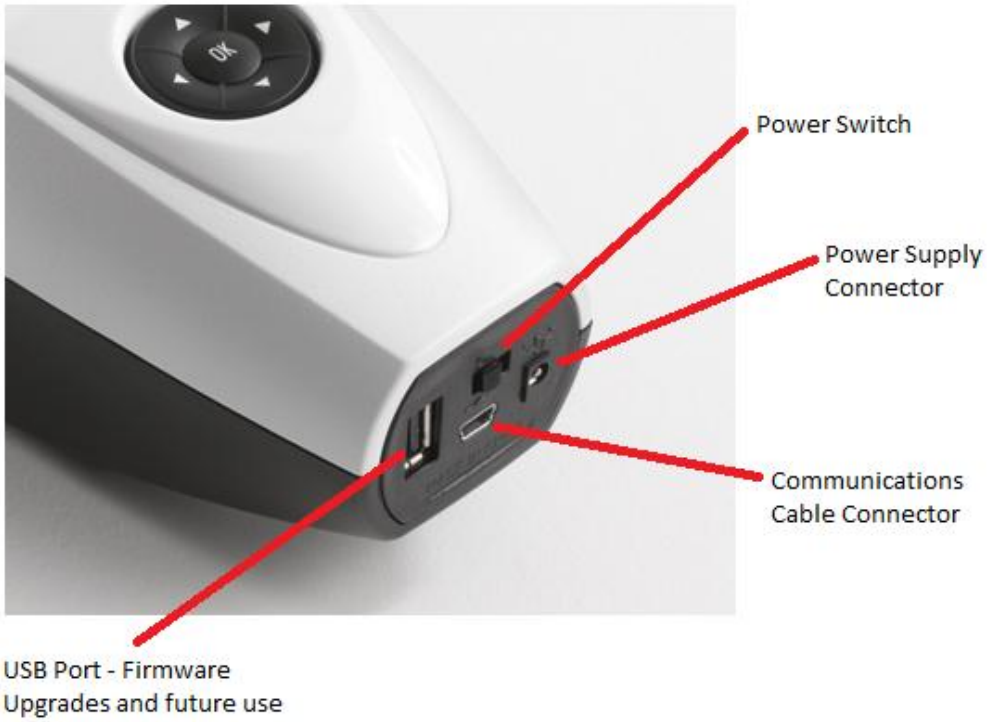
Cables

⚠ WARNING
BE SURE TO TURN OFF THE POWER BEFORE WORKING WITH ANY CABLES.

The Datacolor 45G™ requires the use of two cables, a power cable for recharging the instrument's batteries, and a USB cable, to connect the instrument to the computer.

⚠ WARNING
*Refer to "Electrical/Environmental Requirements section **before** connecting your instrument.*

The connections for these cables are found on the back of the instrument.



Power Supply

A power supply, with multiple region connectors is provided with the instrument.

Power is supplied to the back of the unit via an ac adaptor jack.

WARNING
The power cord supplied with the unit *must* be used. No other cords are acceptable.

Power Switch

The power switch is located on the rear panel of the instrument.

!Note: The power switch must be in the "ON" position to charge the battery, or to power the unit with the battery when the power supply is not connected to the instrument.

The instrument does not charge on the USB cable.

T he AC adaptor must be used to charge the instrument.

Communications Cable

The instrument is connected to a computer through either the USB port or via Bluetooth:

1. Plug the AC Adaptor jack of the power cord into the power receptacle on the rear panel of the instrument. Insert the Adaptor plug into a standard AC outlet.
2. Connect the small USB connector on the instrument cable to the appropriate female connector on the rear panel of the instrument.
3. Connect the large USB connector on the instrument cable to a USB female port on the computer.

Viewing/Changing System Port Assignment

As part of this installation process, a port number is assigned to the USB port or Bluetooth connection. The default selection is the next available com port. Depending on the application you are running, you may need to know this port assignment to configure the Datacolor applications program(s) to recognize the USB port.

NOTES
Some Datacolor programs automatically configure the Bluetooth or USB port assignment. Others require that you manually assign the port number. Refer to the program User's Guide for information to assign/edit the instrument port number.

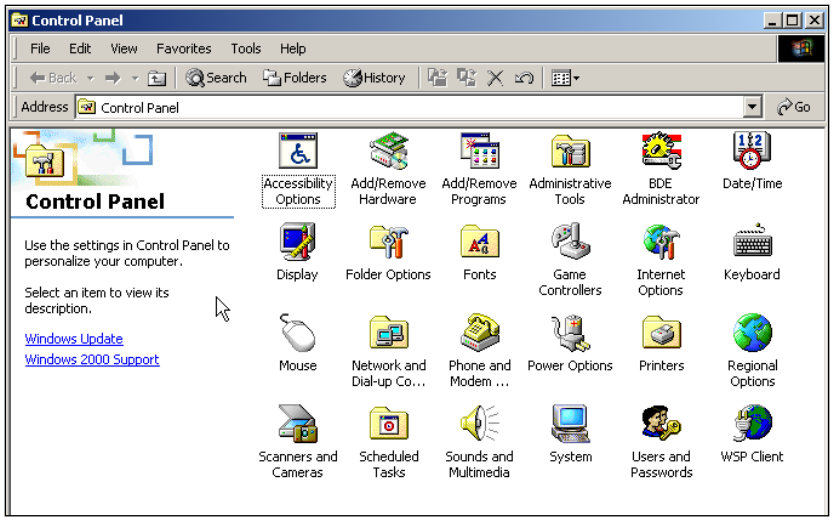
If the computer has more than one USB port, the program will default to the first one available. If you want to connect the instrument to a different USB port, you must assign the port manually in the applications software.

The com port assignment is accessed through the Windows Control Panel as follows:

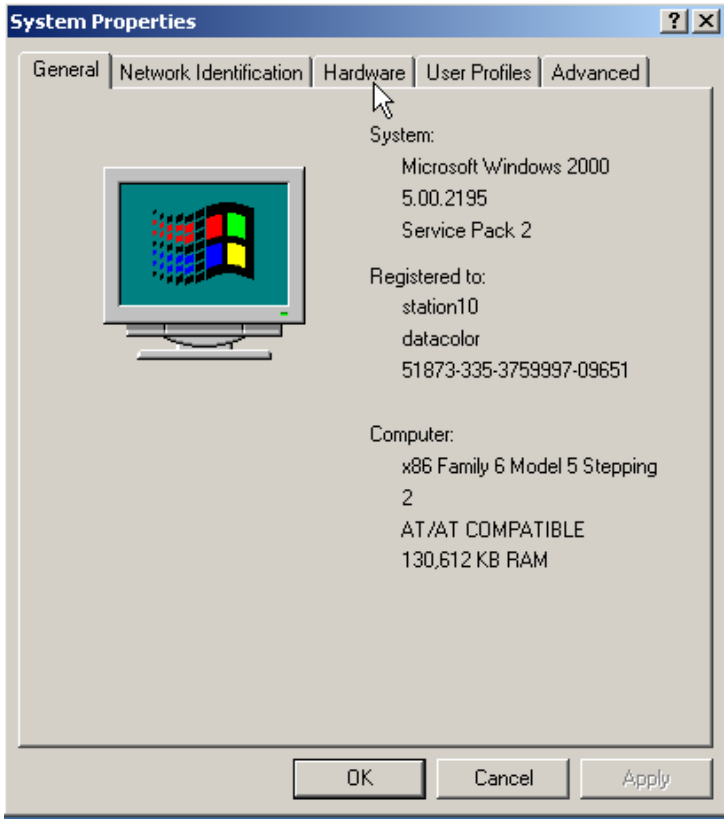
1. Click the **Start** button at the bottom left of the screen.

The Start menu displays.

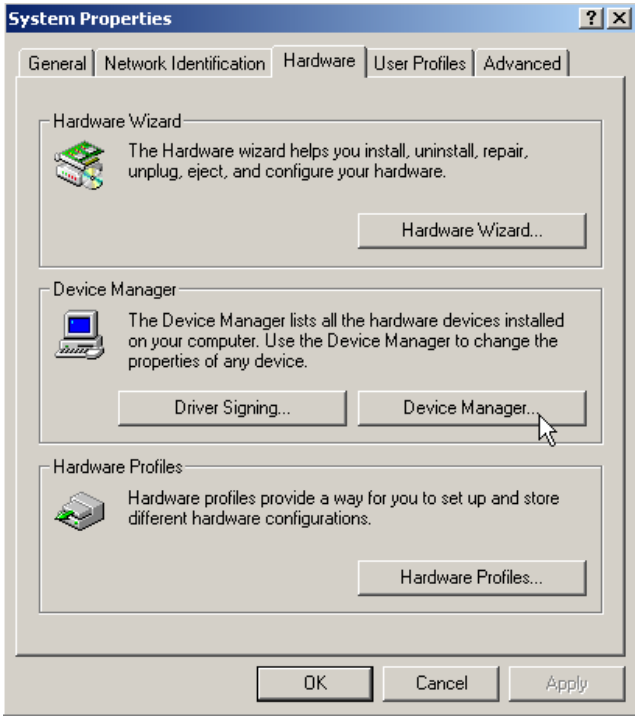
2. Place the cursor on *Settings* so that the program submenu displays, and click **Control Panel**.
3. When the Control Panel window displays, double-click on **System**.



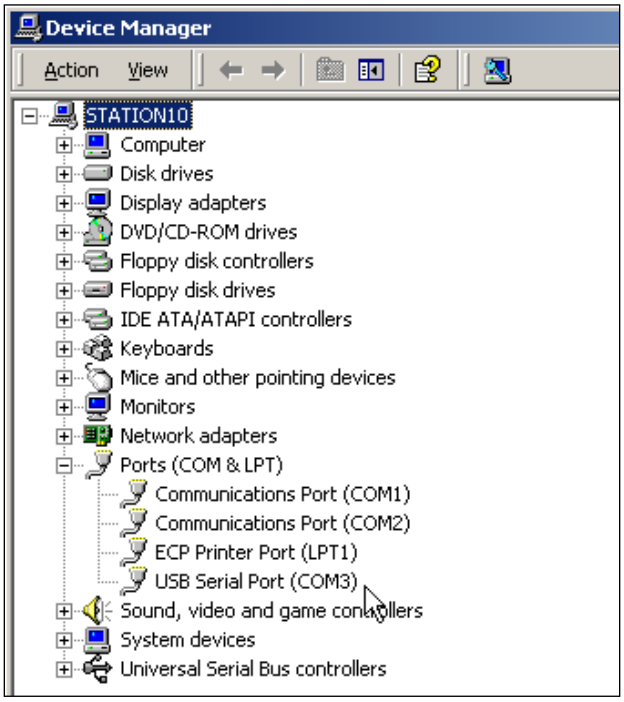
The Systems Properties dialog box displays:



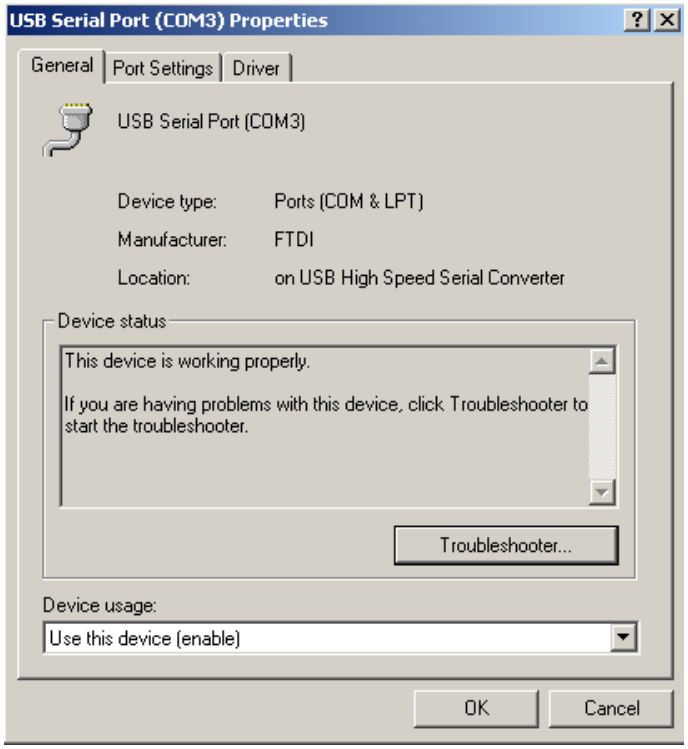
4. Click the **Hardware Tab**.


System Properties
General
Network Identification
Hardware
User Profiles
Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

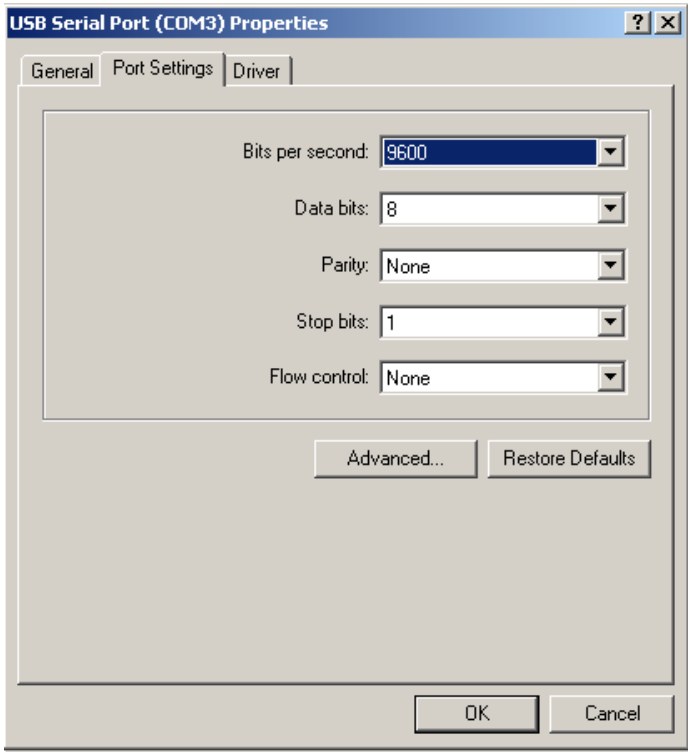
5. Click the **Device Manager** button. The Device Manager window displays.



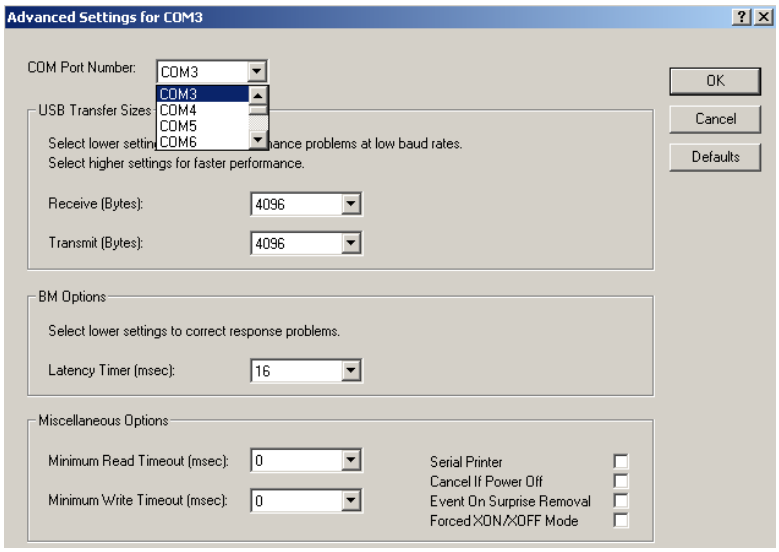
6. Go to the **Ports** heading. Click on the plus (+) to display the port selections.
7.
8. Click **USB Serial Port**. The USB Serial Port (COM3) Properties dialog box displays.



9. Click **Port Settings**. The dialog box below displays:



10. Click the **Advanced** button.
11. The Advanced Settings for COM3 dialog box displays.



The field labeled *COM Port Number* displays the current assignment for the USB port. To change the port setting, click the drop-down list arrow. The list of COM ports is displayed.

12. Click on the port assignment to be used for the USB port.
13. When you have completed the changes, click **OK**.

Changing the COM Port Assignment in Datacolor Programs

To enable the USB port or Bluetooth connection for color measurements, you may need to change the com port assignment in the applications program. *Refer to the program documentation for the specific Datacolor applications program you are running for instructions to configure the instrument.*

Instrument Calibration Data

Each Datacolor 45G instrument has a unique set of Calibration data resident in the firmware. A back-up copy of this unique Calibration Data is provided on a USB Flash Drive included in the Datacolor 45G package. Keep this Memory stick in a safe place in case the calibration data on the instrument is lost.

N O T E S

Maintenance

About Instrument Maintenance

The sections that follow provide detailed instructions for maintaining the instrument and calibration tiles. These instructions and tips will help to insure that the instrument continues to perform properly over its life.

CAUTION
There are no user-serviceable parts for this equipment.

Instrument Cleaning

The measurement port should be examined visually for the presence of dust, sample particles, fibers, and excessive yellowing due to environmental influences. *This inspection should be performed frequently, especially if you measure loose materials.*

If you discover loose materials in the sphere, they should be removed.

Tile Handling and Cleaning

Handling Tiles

- Handle calibration tiles with **extreme care**. Do not drop them, or scratch the glazed surface.
- Always grasp the tile using its edges.

Cleaning Tiles

- The calibration tiles should be cleaned before each use. Wipe each tile clean with a soft, lint-free cloth.
- A detergent, free of optical brighteners, fluorescent materials or photoactive dyes should be used as needed to clear any oils, fingerprints, or other deposits. Liquid dish detergent is a suitable detergent. The detergent/water solution should be prepared as follows:

  1 part detergent: 250 parts water
- Use a few drops of the detergent solution to moisten a soft, lint-free cloth, and gently wipe the tile surface. Rinse the detergent from the tile by wiping it with a cloth, moistened with clean water.
- **NEVER** use abrasive cleansers, razor blades, or other metal objects to remove dirt or foreign substances from the calibration tiles. This will damage the tile surface.
- **NEVER** immerse the tiles in water.
- Tiles that have scratches, chips, abrasions or cracks must be replaced. Signs of wear on the tile surface will affect the accuracy of the calibration.

Storage

- Large temperature variations will affect the accuracy of your calibration, requiring more frequent calibration. The calibration tiles should be stored in an environment that simulates the temperature of the samples to be measured.
- Prolonged exposure to sunlight or other sources of ultra-violet radiation will cause the color of the tiles to change. The tiles should always be stored in a protective case or container away from direct sunlight and environmental contaminants.

Cleaning the Black Trap

- The black trap should be kept dust-free. Dust accumulating in the black trap should be blown out with compressed air.

Appendix

Instrument Specifications

Specifications are subject to change without notice.

ITEM	DESCRIPTION
Instrument Type	Dual beam 45/0 with pan-chromatic LED array.
Measuring Geometry	45º/illumination, 0 º viewing
Illumination Source	Pan-Chromatic LED Array approximating D65 above 400nm
Spectral Analyzer	Proprietary SP 2000 analyzer with dual 256-diode array and high-resolution holographic grating.
Wavelength Range	400 – 700nm
Effective Bandwidth	10nm
Wavelength Resolution	10nm
Photometric Range	0 to 200%
Photometric Resolution	0.003%
Aperture Configuration	Large Area View. 11 mm
Power	Battery: Lithium Ion Rechargable Battery, 3.7V Charge Voltage 4.2V Maximum Charge Current: 1.5A Charge: 0<T<50°C Discharge : -20<T<60°C Store between 40% and 50% capacity; Do not store above 140°F (60°C). Do not crush, short circuit, mutilate, reverse polarity, disassemble, or dispose of in fire; might explode, cause burns, or release toxic materials. AC Adaptor ; 5Vdc, 3.2A (input to the 45G) 100 – 240 VAC(input to the AC power adapter) 50/60 Hz, 0.6A Input Lithium Ion Rechargeable Battery, 3.7V
Performance— Repeatability*	<0.05 CIELAB Max on white ceramic
Performance— Reproducibility*	<0.13 CIELAB ΔE average of 12 BCRA tiles
Absolute Operating Environment	5º to 40º C, 20-85% RH, non-condensing
Interface	Bluetooth ~or~ USB v1.1 or higher
Warranty	1-year parts and labor. Extended warranty available.

** Specification based on following environmental conditions: 20°C; 50% RH; 2 sigma*

N O T E S

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